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ABSTRACT

This paper considers etiological factors associated with fetal alcohol syndrome (FAS), presents a critical review of current findings on language deficits and FAS, and proposes a direction for future research which takes into account the semiotic aspects of language development. Criteria for establishing FAS as well as other typical characteristics are identified. Discussion focuses on methodological issues around findings that young FAS children often show delayed language development, produce less complex grammatical forms than linguistically matched younger normals, and perform more poorly on recall of short term memory tasks than younger children of normal intelligence. Researchers are urged to evaluate language skills in the context of real life communication situations and semiotic aspects including the use of eye contact and gestures. Tables detail the literature review. (Contains 52 references.) (DB)

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Characterizing the Communicative Ability of FPAS Children

Teresa M. Meehan

Paper presented at the conference of the American Association of Applied Linguistics, Atlanta, Georgia, April 18, 1993.

ED 365 078

Introduction

In the United States, an estimated one in every 500 to 600 live births results in a disorder known as Fetal Alcohol Syndrome (FAS), and an estimated one in every 300 to 350 live births results in a milder form of the syndrome known as Fetal Alcohol Effects (FAE) (Burgess and Streissguth, 1992). Despite warnings from the United States Surgeon General, who advised women to abstain from drinking during pregnancy, "fetal alcohol syndrome is now recognized as the leading known cause of mental retardation in the western world" (Burgess and Streissguth, 1992). It is also the only **preventable** cause of mental retardation.

One of the first researchers to identify the physical malformations that are associated with FAS was Dr. Kenneth Jones, professor of pediatrics at the University of California San Diego School of Medicine. In a report to the United States Senate, he stated that "fetal alcohol syndrome occurs in approximately 44 percent of chronically alcoholic women who continue to drink heavily throughout their pregnancy" (Alcohol Warning Labels, Senate Hearing, 1988, p. 56). It should be made clear, however, that incidences of FAS are not limited to the population of women who are known alcoholics. Dr. Ann Streissguth and her colleagues at the University of Washington Fetal Alcohol and Drug Unit report that even children born to mothers who drink socially (i.e., one to two drinks per day) throughout their pregnancy are at increased risk for learning disabilities and other cognitive problems (Burgess and Streissguth, 1992).

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The extent to which other lifestyle factors influence adverse pregnancy outcome is unknown. However, in a national membership survey conducted by Alcoholics Anonymous (1984), 64% of the females under 31 years of age reported addiction to an additional drug such as cocaine, marijuana, nicotine, caffeine, prescription tranquilizers or stimulants. And in a report by the National Institute on Alcohol Abuse and Alcoholism (1987), it was noted that "poor nutrition, and lack of prenatal care" may be associated with some of the debilitating effects (p. 2). Although animal research has shown that different profiles of alcohol-related birth defects are related to critical periods for specific aspects of fetal development (Randall, 1987), it is often the operation of multiple factors that contributes to the characteristic physical, mental and behavioral disorders that have been associated with FAS (Schile, 1989). As such, I propose that the term fetal polydrug abuse syndrome (FPAS) be used in describing the **general** effect of intrauterine drug and alcohol exposure on fetal development. Acknowledgment of a general effect is an important reality factor associated with research involving this special population. I am **not** suggesting that the effects of prenatal exposure to alcohol, marijuana, cocaine, heroine, methadone, or a variety of other drugs is realized as a single disorder associated with a single set of diagnostic criteria. Different drugs produce varying physical effects as a function of the chemical make-up of the drug in question. Thus, an infant affected primarily by alcohol in utero is not going to exhibit the same characteristics as a so-called "crack baby" (Rist, 1990).

Research pertaining to the impact of prenatal exposure to drugs and alcohol on children's subsequent language development is virtually non-existent, and the few studies that do exist deal primarily with fetal alcohol syndrome. In this paper, I will briefly discuss the etiological factors associated with FAS, present a critical review of the current findings associated with language

deficits and propose a direction for future research which takes into account the semiotic aspects of language development.

Etiology

In 1973, Doctors Kenneth Jones and David Smith published the first report that systematically defined the characteristic physical features typically associated with FAS (Jones and Smith, 1973). And in 1980, the Fetal Alcohol Study Group of the Research Society on Alcoholism proposed specific criteria to be used by medical personnel in the diagnoses of the Syndrome (Rosett, 1980). These criteria require that at least one feature from each of the three categories listed in Table 1 be present for a diagnosis of FAS.

Insert Table 1 about here

Some of the characteristic facial features are illustrated in Figure 1.

Insert Figure 1 about here

Additional symptoms often include congenital anomalies of the heart, joints and limbs. But of all the known defects that are characteristic of FAS, mental deficiencies of varying degrees along with related behavioral disorders such as hyperactivity and attention deficit disorder

appear to be the most debilitating. Steissguth, Herman, and Smith (1978) hypothesized that children who are more severely affected by the Syndrome, as measured by the number and degree of physical abnormalities, will show greater mental deficiencies as measured by age appropriate standardized IQ tests (0-2½, Bayley Scales of Infant Mental and Motor Development; 2½-5, Stanford-Binet Form L-M; 6-15 WISC R; and 16 and over, WAIS). The results of their study are shown in Figure 2.

Insert Figure 2 about here

The general range of IQs found in children with FAS has been reported to vary from normal to profoundly retarded. In Streissguth *et al*'s study of 20 patients, the range of IQ scores fell between 15 and 105 with a mean IQ of 65. It was discovered that the IQ scores of these children were inversely related to the severity of physical anomalies; that is, physical malformations rated on a continuum from mild to severe were negatively correlated with degree of mental retardation. Subsequent studies have shown similar results (Iosub, S., Fuctis, M., Bingel, N., and Gromisch, D., 1981; Streissguth, 1976).

Characterizing Linguistic Abilities

The First Study. Throughout the 1970's, research concerning language development in children with FAS was limited to clinical observation (Abel, 1990). Hamilton's 1981 dissertation was

actually the first study to appear in which the linguistic abilities of children with FAS were the primary focus of investigation.

Hamilton compared the linguistic performances of ten children (ranging in age from 4;5 to 6;10, M = 5;1), who had been diagnosed at birth as having FAS, with normal children of the same chronological age, with normal children that were younger chronological age (3;0 to 3;10, M = 3;5) but at the same linguistic level as measured by MLU (range = 3.0-4.49), and with children of comparable age (4;2 to 6;9, M = 5;0) and intellectual ability as measured by IQ scores from either the *Wechsler Preschool and Primary Scale of Intelligence* (Wechsler, 1967) or the *Stanford-Binet Intelligence Scale* (Terman and Merrill, 1973). The third group was made up of children diagnosed as having Prader-Willi Syndrome. Although the exact cause of Prader-Willi Syndrome is unknown, children who are born with it often exhibit central nervous system dysfunction which typically manifests itself in some degree of mental retardation (Schultze, 1980; cited in Hamilton, 1981). The FAS children, the younger normals and the subjects with Prader-Willi Syndrome were matched according to sex (5 males and 5 females) and socioeconomic status (6 lower class and 4 middle class). The comparisons made between the FAS subjects and the normal children of the same chronological age were based on normative data drawn from each of the standardized language tests. Consequently, no comparisons were possible between the FAS group and the normal group of comparable age for those tests in which normative data were not available.

Hamilton administered a battery of tests for the purpose of assessing syntactic, semantic, and pragmatic abilities as well as short-term memory. Syntactic ability was measured by scores on the *Northwestern Syntax Screening Test* (NSST) (receptive portion) (Lee, 1971), and the

Developmental Sentence Scoring (DSS) procedure (Lee, 1974). The determination of semantic ability was based on scores from the *Peabody Picture Vocabulary Test* (PPVT) (Dunn, 1959), lexical type-token ratios (LTTR) (i.e., a measure of vocabulary calculated by dividing the number of different words [types] from a discourse based language sample by the number of words in the sample [tokens]), and the mean number of semantic categories per utterance (based on Bloom and Lahey, 1978). Pragmatic ability was determined by the frequency of initiations and responses within a 100-utterance language sample. Short-term memory was assessed via subtests from the *Detroit Test of Learning Aptitude* (DTLA) (Baker and Leland, 1967). A summary of the results are presented in Table 2. The data from the Prader-Willi subjects were not included because it was determined that they did not add to the description of the linguistic abilities of the children with FAS. The most informative data in this study were observed in the comparisons between the matched younger controls and the FAS subjects.

Insert Table 2 about here

Hamilton found that the FAS children in her study did not comprehend or produce structures that were as linguistically complex as normal children of comparable age. When compared to the normative data provided by the standardization of the NSST (receptive) and the DSS, the FAS group ranked well below the 10th percentile.

With regard to the comparison between the FAS children and their matched younger controls, some statistically significant differences occurred which, for the most part, Hamilton

attributed to delayed acquisition on the part of the FAS children. Under the heading, "syntactic ability," the results shown in Table 2 indicate that the FAS children comprehended grammatical forms much like the younger normals. However, the FAS children produced less complex grammatical structures than their linguistically matched younger controls. In addition, the FAS children utilized significantly fewer semantic categories in the controlled language sample than the younger controls.

Some of the most interesting results of this study appear as a part of the assessment of the pragmatic component of linguistic ability. Hamilton writes that

> the use of pragmatic functions in FAS children was similar to that observed in normal three-year-olds, with one exception. The FAS subjects exhibited significantly fewer adequate responses as compared to younger normals. This finding, coupled with the fact that the FAS children "responded" with approximately the same frequency as did younger normals, suggests that the FAS children attempted to fulfill their conversational obligation to take a turn in dialogue with little regard for whether these turns were complementing the investigator's antecedent utterances (p. 38).

Although I agree with Hamilton's premise that the FAS children appeared to understand the pragmatic function of discourse, at least in terms of basic turn-taking, perhaps more can be learned from the fact that the FAS children not only made fewer adequate responses than the younger normals but they also made **inadequate** responses with significantly greater frequency. It is possible that the FAS children in this sample did not perceive the communicative function of language as a means by which information is shared as a part of the joint interaction (Damico, 1985; Damico, Oller, and Storey, 1983). It is also possible, however, that their communicative

intent was misinterpreted by the clinician. Consider the data presented in Table 3. This discourse sample originally appeared as a part of Appendix E in Hamilton's dissertation.

Insert Table 3 about here

According to Grice's *Cooperative Principle* (1975), conversation requires a cooperative effort between participants. "The cooperation is based on a mutual and usually implicit adherence to a set of conversational postulates; if participants fail to do this, communication tends to break down and meaning is lost" (Damico, 1985, p. 173). In this example, the adult participant began the conversation with the question, *What did you have for breakfast today?* The child responded, *I didn't have some breakfast*, and the adult followed with another question, *Why didn't you have breakfast?* The child responded to the second question with, *I gotta go to grandma's and think.* Apparently the adult felt the response was inappropriate and proceeded with a third question, *Did you have cereal?* Somewhere between the child's response to the second question and the third question presented by the adult the conversation broke down. It appears that the adult partner may have simply misinterpreted the communicative intent of the child (i.e., the child had to go to grandma's and they were running late so s/he didn't have time to eat breakfast, or perhaps, the child didn't know why s/he didn't have breakfast and needed to go to grandma's to think about it). Based on the information given in the discourse, it is likely that the child did not, in fact, eat breakfast since s/he reiterated this point in the final turn of the discourse interaction and s/he may have become confused by the adults' questions. Regardless, the adult partner violated

Grice's third maxim which states that contributions to the conversation must be relevant. The child had already informed the adult that s/he did not have breakfast. So, why did the adult ask if the child had cereal?

I would suggest that Hamilton's findings be approached with caution because even though FAS children do apparently tend to show deficits in the pragmatic function of language, interpretation of such deficits necessarily requires more than the analysis of simple surface-oriented distinctions. This point will be further elaborated on later in this paper.

Hamilton's study represents an intelligible and systematic attempt at characterizing the linguistic abilities of children with FAS, but her conclusions are very general and do not account for most of the subtle language difficulties that have been observed by medical personnel. For example, Hamilton wrote that the "FAS subjects did not produce as semantically complex utterances as did younger normals" (p. 46). Semantic complexity was determined by the number of semantic categories, as defined by Bloom and Lahey (1978), that were coded within the elicited 100-utterance language sample. Unfortunately, Hamilton did not provide any detailed information concerning the frequencies in which particular semantic categories occurred. In other words, it would be interesting to examine the extent to which FAS children expressed abstract notions such as time and place, for example, when compared to younger children of normal intelligence.

The Second Study. A second attempt was made to characterize the linguistic abilities of FAS children in a study by Becker, Warr-Leeper, and Leeper which was published in 1990. Their study was very similar to that of Hamilton's except that their subjects consisted of eight native North American Indian children ranging in age from 4;9 to 9;5 ($\underline{M}$ = 6;5). In each case, English

was the primary language spoken in the home but all of the subjects had some exposure to the Ojibwa language. Proficiency in the second language was undetermined. Six matched controls were selected on the basis of nonverbal cognitive ability as measured by the *Raven's Coloured Progressive Matrices* (Raven, Court, and Raven, 1977). The control subjects were also local native children who ranged in age from 3;8 to 6;8 ($\underline{M}$ = 5;3). Matched controls for two of the FAS children could not be found which left only six matched pairs for comparison.

In addition to measures of linguistic ability, Becker *et al* (1990) assessed the oral-motor and articulatory abilities of the two groups of subjects. They found that the FAS group showed a higher percentage of deviations in the structure of the teeth and gums, as well as in functional movements of the tongue and larynx.

In terms of characterizing the linguistic abilities, Becker *et al* administered a battery of standardized language tests which included two measures of grammatical comprehension, the *Test of Auditory Comprehension of Language* (TACL)- syntax and morphology subtest (Carrow, 1973), and the *TOKEN*- Part V (De Renzi, and Vignollo, (1962), three measures of grammatical production, the *Northwestern Syntax Screening Test* (NSST)- expressive portion (Lee, 1971), the *Developmental Sentence Scoring* procedure (DSS) (Lee, 1974), and the Grammatical Closure subtest of the *Illinois Test of Psycholinguistic Abilities* (ITPA) (Kirk, McCarthy, and Kirk, 1968).

Semantic ability was assessed via three comprehension tasks, the auditory and association and auditory reception subtests of the ITPA, and the vocabulary and morphology sections of the TACL, and one production task, the naming on confrontation subtest of the *Clinical Evaluations of Language Functions* (CELF) (Semel and Wiig, 1980). Parts I-IV of the TOKEN test (De Renzi and Vignollo, 1962) were used to evaluate short-term memory.

For each of the ten language measures (see above), two sets of derived standardized scores were calculated from the individual raw scores for each subject. In the first instance, a new derived score was calculated by dividing the individual raw score by the child's chronological age (CA), and in the second instance, a new derived score was calculated by dividing the individual raw score by the child's mental age (MA) (as previously determined by means of the *Raven's Matrices* test). It was determined that differences between the FAS subjects and the controls, based on a comparison of the derived scores by CA, would illustrate quantitative differences in terms of variation in acquisition rate. Qualitative differences, that is, differences beyond those that could be accounted for "on the basis of general cognitive or intellectual deficits," were illustrated in the comparison of derived scores by MA (Becker *et al*, 1990, p. 109). By definition, Becker and her colleagues found several statistically significant quantitative differences, especially in terms of comprehension, but no qualitative differences. A summary of the results can be found in Table 4.

Insert Table 4 about here

The Mann-Whitney U ranking procedure, a nonparametric analog to the parametric *t* test, was employed to determine statistical differences between the two groups. (Mann, and Whitney, 1947). In Becker *et al*'s sample, the FAS group comprehended and produced significantly fewer complex grammatical structures (syntactic and morphological) than the younger controls. In addition, the FAS group demonstrated comprehension of significantly fewer single word

vocabulary items and demonstrated an overall poorer recall ability as a function of short-term memory. Statistical differences in the pooled measures of grammatical ability and the pooled measures of semantic ability were not apparent for CA or MA. Here, it is possible that the categories, grammatical ability and semantic ability, were too general to find significant differences.

Summary of the Results. Of the two studies presented here, many of the findings are in general agreement. Both Hamilton (1981) and Becker *et al* (1990) found FAS children's linguistic performances to be significantly below the mean performances of normal children of comparable age across the board. In addition, the results of both studies indicate that FAS children tend to produce less complex grammatical forms than linguistically matched younger normals and that recall on short-term memory tasks is generally poorer than for younger children of normal intelligence.

Some of the findings between the two studies are in conflict. Hamilton found that the FAS children in her study appeared to comprehend grammatical forms much like the younger children. Becker *et al*, on the other hand, found that the FAS children in their study neither comprehended nor produced grammatical structures as linguistically complex as did the matched younger controls. Interestingly enough, however, the pooled measures both for grammatical ability and for semantic ability in Becker *et al*'s study showed no significant differences across groups.

Testing the Tests. Formal, standardized language tests of the type that were used as analytic tools in the above two studies are generally considered to be valid to the extent that they measure what

they purport to measure (Oller, 1979), and that they are administered to the population for which they were intended (Bachman, 1990). That is, if the population being tested differs in some significant way from the population in which the test was standardized, the test is inherently less valid. With regard to Hamilton (1981) and Becker *et al*'s (1990) studies, some questions of validity do arise. For example, the NSST standardization sample consisted of middle to upper-middle class suburban communities in the midwest. Similarly, the ITPA standardization sample consisted of predominantly middle-class Illinois and Wisconsin children (Lund and Duchan, 1993). Both the NSST and the ITPA have been proved biased against children of low socioeconomic status (Larson and Summers, 1976); yet, Hamilton used the NSST as a receptive measure of syntactic ability even though 6 of the 10 subjects in her study were classified as having low socioeconomic status. In the case of Becker *et al*, recall that their subjects were comprised of members of the Ojibwa Indian tribe who were residents of Northwestern Ontario. Here, the differences in geographical location between the standardization populations of the NSST and the ITPA and the study sample were substantial in terms of both physical location and potential cultural influence. And even though Becker *et al* reported that English was the primary language of their Native North American subjects, they admitted that most of the children in their sample had some exposure to the Ojibwa dialect. Again there should be some concern as to the validity of their results since the NSST, the Grammatical Closure subtest of the ITPA, and the DSS are all considered inappropriate for speakers of dialects other than standard American English (Lund and Duchan, 1993).

The PPVT, which is typically used to assess auditory comprehension of picture names, is generally considered to be one of the best standardized language tests available (Lund and

Duchan, 1993). However, researchers have warned that "the PPVT is not an adequate measure of hearing vocabulary in mentally handicapped subjects since it is also clearly related to visual decoding ability, as measured with the Illinois Test of Psycholinguistic Abilities (ITPA), and that the use of the PPVT as a measure of intelligence in the mentally handicapped person may be misleading" (Williams, Marks, and Bialer, 1977, in Spreen and Strauss, 1991, p. 266; also see Candler, Maddux, and Johnson, 1986; Sattler, 1982).

A Theoretical Approach to Future Research

An underlying assumption of discrete point language tests of the type discussed thus far is that language is comprised of an autonomous system of isolating components or modules (e.g., phonology, morphology, syntax, semantics, and pragmatics) that can be observed, measured and analyzed as a set of independent structural entities. The popularity of this approach among researchers is, at least in part, due to the relative ease with which these tests can be administered. Yet, the extent to which we can draw inferences from the results of such test batteries is limited. Once again, it is important to emphasize that tests are only valid to the extent that they measure what they purport to measure. Discrete point language tests purport to measure the so-called autonomous components of language as they exist once they are removed from a meaningful context. Any conclusions concerning an individual's linguistic abilities cannot, by definition, be extended to include any other language situation other than that in which items are analyzed in isolation unless they are tested as well (Damico, 1985, 1991; Oller, 1979; 1983; 1989; 1990; 1991; Oller and Damico, 1991). An analysis of the same data presented above utilizing an approach such as Damico's (1985) *Clinical Discourse Analysis*, which was designed to analyze

language from a functional rather than a structural point of view, would probably yield different results from those found in Hamilton and Becker *et al*'s studies. And I would venture to say that the conclusions we could draw from such an approach would provide more meaningful insight to the problem at hand.

So what kinds of meaningful conclusions can we draw then, concerning the linguistic abilities of children with FAS based on the data presented above? The fact is, very few. We know that FAS children tend to perform about as well as younger children of normal intelligence on language tasks that are unrelated to the spontaneous language that occurs in everyday communication. In addition, we know very little about the FAS child's abilities to make inferences and perform other higher cognitive functions.

Thus, any attempt at characterizing the linguistic abilities of a population that relies solely on information derived from the "independent" isolating components of language is analogous to analyzing the individual pieces of a puzzle and then trying to draw inferences as to what the completed picture will look like once the puzzle is assembled. The truth is that we will never know what the completed picture will look like because too many pieces are missing.

Language is an integrated whole that cannot be separated from the context in which it occurs in order for it to have meaning. Language is a semiotic system in which information is transmitted and received via multiple modalities. Too often, researchers consider linguistic (verbal) information apart from sensory-motor and kinesic (gestural) information (Oller, 1989, 1991; Oller and Damico, 1991). I suggest that in order to truly characterize the communicative abilities of children with fetal polydrug abuse syndrome, future research must necessarily include the semiotic aspects of language development. Specific questions which might be asked include:

does the child maintain eye contact during communicative interactions, or what types of gestures accompany the spoken discourse? In an article intended for classroom teachers, Burgess and Streissguth (1992) explained that teachers need to be aware of the different ways in which FAS children communicate. For example, if a child is asked to perform a task and the child responds as if s/he understands but then turns and walks away, the child is probably not just showing disrespectful behavior. Rather, s/he may be communicating that they really didn't understand the request. In sum, these types of communicative behaviors will never be explained by the types of standardized language tests that have been discussed in this paper.

Table 1. Physical features associated with FAS (composite profile based on 245 cases complied by Clarren and Smith (1978)).

CATEGORIES	FEATURE MANIFESTATION
• Growth deficiency	
Prenatal	<2 SD for length & weight*
Postnatal	<2 SD for length & weight*
• Cranio-facial features	
Head	Small head circumference*
Eyes	Short eye slits*
	Droopy eyelids
	Crossed eyes
	Skin folds over inner corner
Nose	Short, flat, upturned+
	Indistinct ridges between the nose and mouth*
Mouth	Thinned upper lip*
	Cleft lip or cleft palate
	Underdeveloped jaw+
• Central Nervous System	
Intellectual	Mild to moderate mental retardation*
Neurologic	Brain malformation*
	Poor co-ordination+
	Loss of muscle tone+
Behavioral	Irritability in infancy*
	Hyperactivity in childhood+

* Reported in >80% of patients
+ Reported in >50% of patients
All other features reported in between 1 and 50% of patients

Fetal Alcohol Syndrome

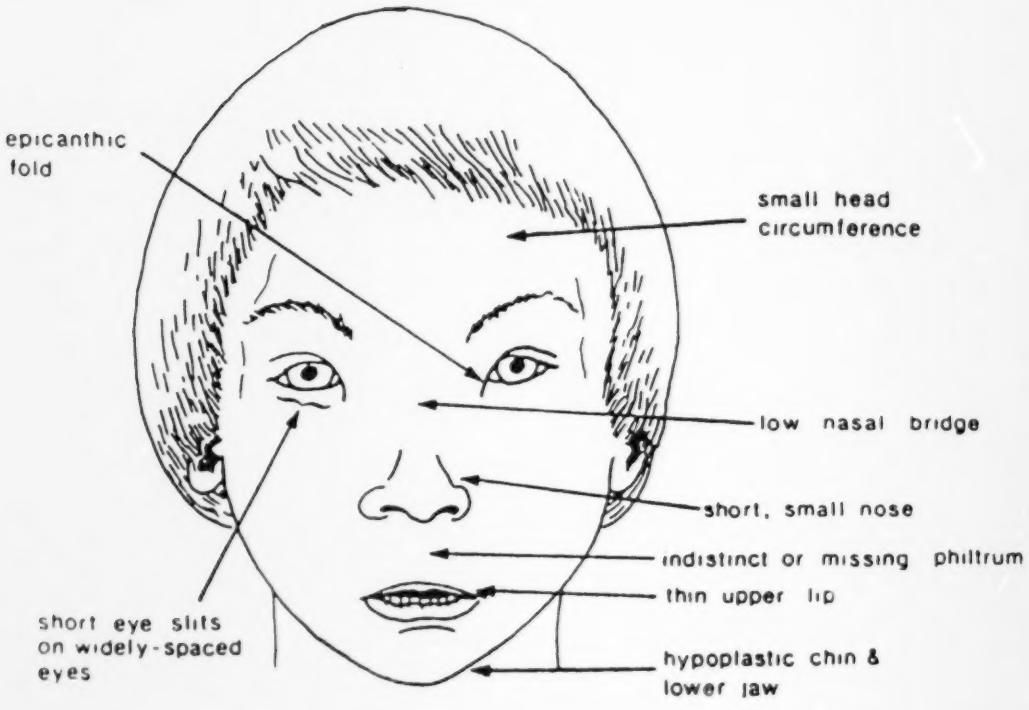

FIG. 1. Sketch illustrating typical facial features associated with FAS. (Light, 1988, p. 85)

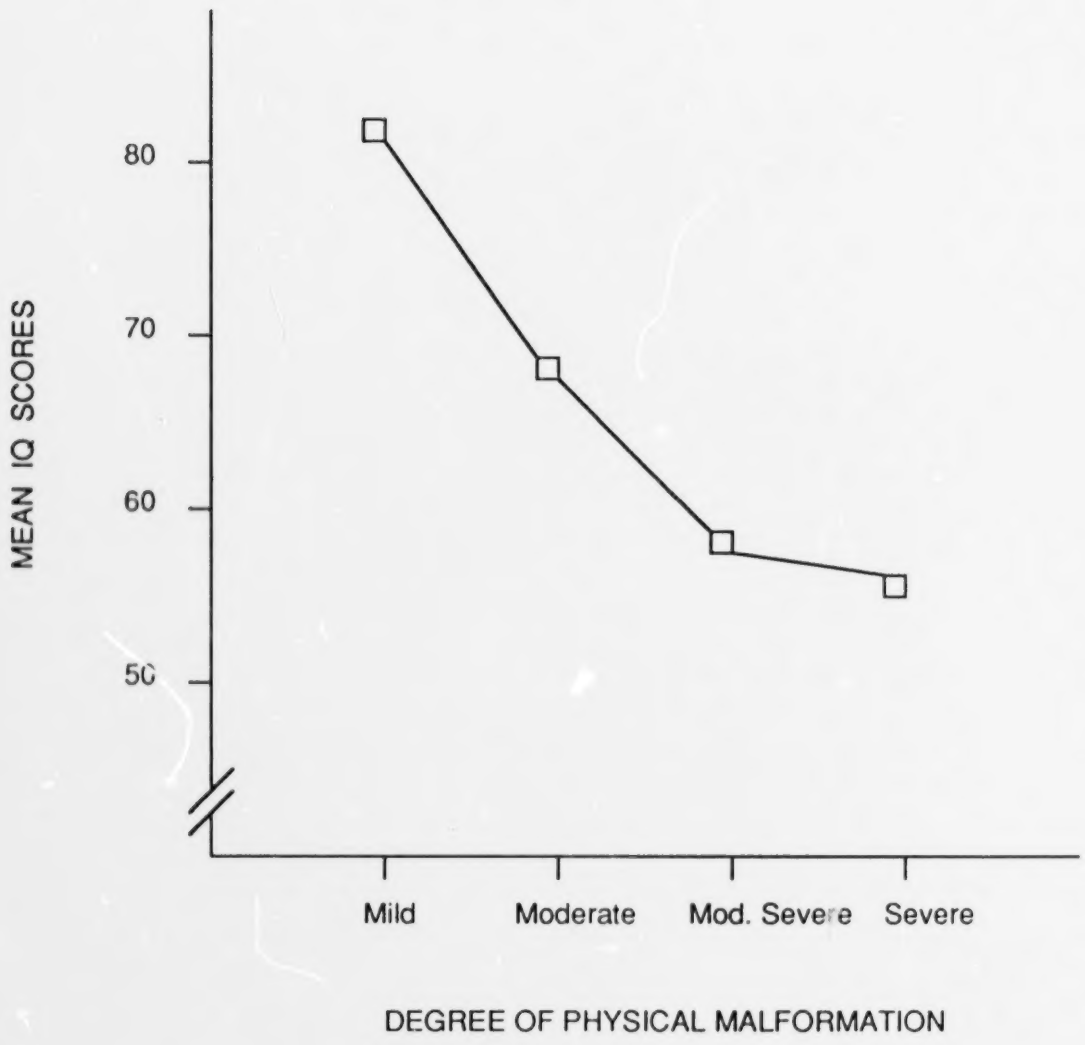

FIG. 2 Mean IQ scores with graded severity of physical anomalies characteristic of FAS (adapted from Streissguth et al, 1978)

Table 2. Means and standard deviations for measures of linguistic ability (adapted from Hamilton, 1981).

	Comparison Group				
	FAS children		Younger norms		Standardized Norms by CA
Measures	Mean	SD	Mean	SD	Percentile
Syntactic Ability					
NSST (receptive)	21.20	(4.58)	24.70	(4.98)	< 10 %
DSS	**5.30**	**(.87)**	**5.40**	**(.80)***	< 10 %
Semantic Ability					
PPVT (IQ)	**85.70**	**(18.75)**	**102.50**	**(10.16)***	< 15 %
LTTR	.54	(.05)	.57	(.03)	
Categories per utterance	**1.55**	**(.17)**	**1.74**	**(.10)***	
Pragmatic Ability					
Initiations	36.50	(16.70)	37.50	(11.48)	
Requests	12.30	(6.79)	10.60	(5.50)	
Comments	24.50	(14.87)	26.90	(9.68)	
Responses	59.90	(19.36)	56.20	(12.84)	
adequate	**67.70**	**(5.79)**	**85.50**	**(7.60)***	
inadequate	**30.00**	**(6.96)**	**9.60**	**(5.56)***	
ambiguous	2.30	(2.98)	4.90	(8.13)	
no response	1.40	(.96)	2.60	(2.59)	
Memory Ability					
DTLA					
Subtest 6	23.60	(6.85)	30.60	(12.07)	
Subtest 13	**18.80**	**(7.43)**	**36.20**	**(10.00)***	

* $p<.05$

Table 3. Example dialogue between a child diagnosed with FAS and an adult partner. (taken from Hamilton, 1981, Appendix E, p. 75).

Adult Utterances	Child Utterances
What did you have for breakfast today?/	
	I didn't have some breakfast/
Why didn't you have breakfast?/	
	I gotta go to grandma's and think/
Did you have cereal?/	
	Daddy left my breakfast in the car/
So you didn't have breakfast?/	
	yes/
Well, what did you have for breakfast?/	
	I didn't have some breakfast/

Table 4. Mann-Whitney U values for comparison of FAS and control subjects by CA and MA on ten language measures (adapted from Becker *et al*, 1990).

	CA		MA	
Measures	FAS	Controls	FAS	Controls
Grammatical Ability				
Comprehension				
TACL- Syntax/Morph	44	4**	32	16
TOKEN- Part V	16.5	1.5*	12	6
Production				
NSST- Expressive	26	10	18.5	17.5
DSS	45	3***	35	13
ITPA- Grammatical Closure	31.5	?	17.5	?
Pooled Measures	16	9	13	12
Semantic Ability				
ITPA- Reception	31	17	48	16
ITPA- Association	29	19	21	27
TACL- Vocabulary	44	4**	27	21
CELF- Naming	16	8	10	14
Pooled Measures	10	7	8	0
Memory Ability				
TOKEN- Parts I-IV	35.5	4.5*	27	13

*** $p<.002$
** $p<.005$
* $p<.05$

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